Claims

1. Method for regulating an internal combustion engine according to one or more physical models,
wherein measurement values and adjustment values are provided as system parameters, underlying the physical model, in order to operate the internal combustion engine according to a regulation,
wherein one or more adaptation values can be applied, respectively, to said system parameters in order to adapt said physical model to real conditions of the internal combustion engine,
wherein estimation parameters are determined by means of said system parameters,
wherein measurement parameters are determined in a measurement of the physical parameters underlying said estimation parameters,
wherein the measurement parameters are evaluated in relation to the estimation parameters,
wherein adaptation values are determined for at least one part of said system parameters according to an adaptation method, by means of said measurement parameters,
wherein a first operating mode or a second operating mode is adopted depending on said adaptation values.

2. Method according to Claim 1, wherein the adaptation method is implemented in the first operating mode and a further adaptation method is implemented in the second operating mode.

3. Method according to Claim 1 or Claim 2,
wherein a first estimation parameter is determined by means of a first system parameter and/or a second system parameter and/or a third system parameter,

wherein a second estimation parameter is determined by means of the first system parameter and/or second system parameter and/or third system parameter,

wherein a first measurement parameter is determined in a measurement of a physical parameter underlying the first estimation parameter, in particular in an exhaust pipe, and a second measurement parameter is determined in a measurement of a physical parameter underlying the second estimation parameter, in particular in an intake pipe,

wherein the first measurement parameter is evaluated in relation to the first estimation parameter and second measurement parameter is evaluated in relation to the second estimation parameter,

wherein a first adaptation value of the first system parameter is determined with the aid of the first measurement parameter,

wherein in the first operating mode a second adaptation value for the second system parameter is determined with the aid of the second measurement parameter and a third adaptation value for the third system parameter is left unchanged,

wherein a change in the second adaptation value effects on the basis of the regulation a change in the first system parameter,

wherein the second operating mode is adopted if the first adaptation value determined deviates from a neutral value by a first absolute or relative deviation value and the second adaptation value determined in the first operating mode deviates from a neutral value by a second absolute or relative deviation value, wherein in the second operating mode the second adaptation value for the second system parameter is reset and with the aid of the second measurement parameter the third adaptation value for the third system parameter is determined and the second adaptation value for the second system parameter is left unchanged after the resetting.

4. Method according to Claim 3, wherein the resetting of the second adaptation value is carried out gradually.

5. Method according to Claim 3 or Claim 4, wherein when the second adaptation value is reset, the second adaptation value is switched to a corresponding modification of the first adaptation value and/or a corresponding third adaptation value.

6. Method according to any one of Claims 3 to 5, wherein the second operating mode is adopted if the first adaptation value determined is increased relative to the neutral value by the amount of the first deviation value and the second adaptation value determined in the first operating mode is reduced relative to the neutral value by the amount of the second deviation value, or if the first adaptation value determined is reduced relative to the neutral value by the amount of the first deviation value and the second adaptation value determined in the first operating mode is increased relative to the neutral value by the amount of the second deviation value.

7. Method according to any one of Claims 3 to 6, wherein the first operating mode is adopted each time the internal combustion engine is started.

8. Method according to any one of Claims 3 to 7, wherein after a specified period a transition is made from the second operating mode to the first operating mode without the third adaptation value being reset.

9. Method according to any one of Claims 3 to 8, wherein a

parameter which influences the opening time of a fuel injection valve is provided as a first system parameter, and/or the flow cross-section of the air flow let into the intake pipe is provided as a second system parameter and/or an absorption characteristic curve of the internal combustion engine or a valve setting of an intake and/or outlet valve is provided as a third system parameter.

10. Method according to any one of Claims 3 to 9, wherein the air/fuel ratio in an exhaust pipe of the internal combustion engine is determined as a first measurement value and/or the suction pipe pressure in a suction pipe of the internal combustion engine is determined as a second measurement value.